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SOME CASES OF SALTATORY VARIATION.

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Some specimens showing saltatory variation have been collected at various times for the museum of the Indiana University. It is the purpose of the present paper to place these on record.

1. A remarkable case of meristic abnormality was collected near Harrodsburg, Ind. The specimen is a male of the common frog, *Rana pipiens* Schreber, 54 mm. long, and shows the following characters (Fig. 1):

The forearm and hand of the right side are duplicated. The extra part arises just behind the normal arm and passes inward and forward to below the eye of the left side. It is 19 mm. long from its origin to the base of the fourth finger and 2 mm. in diameter. The normal right forearm is 12 mm. long and 5 mm. thick. Its striking and unique feature is the band of skin through which it passes, and which holds it as a sling. This band is well represented by the photograph, and is 4 mm. wide. The supplementary arm and wrist are so placed that the fourth finger occupies the posterior place. The second, third, and fourth fingers are as in the normal hand, but more slender. Separated from these there are, in the place of the first finger, two fingers, of which the first is the longer. The free portions of the five fingers measure respectively 4, 2, 3½, 5, and 3 mm. On the anterior margin of the base of the first finger there is a broad callosity.

On the lower surface of the lower jaw, below the left eye, there are two tubercles, the posterior one the longer, measuring 1½ mm. in height. There are no other indications of abnormalities.

The variation here recorded may be classed with pathological abnormalities rather than with variations that lead to the mutation of species.

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[1] *Contributions from the Zoölogical Laboratory of the Indiana University*, No. 38.

2. The second case is of much greater interest. It is a specimen of *Ameiurus natalis*, 120 mm. long, from Turkey Lake, Ind. It differs from normal specimens in the absence of all traces of ventral fins. There are no scars to indicate that the fins might have been lost as the result of a wound, and we may safely assume that in this specimen we have a case of saltatory variation which is perfectly bilateral. Such a variant, if its characters should be slightly prepotent, would give rise to a race of individuals without ventral fins, which, in nature, would readily be recognized by naturalists as a distinct

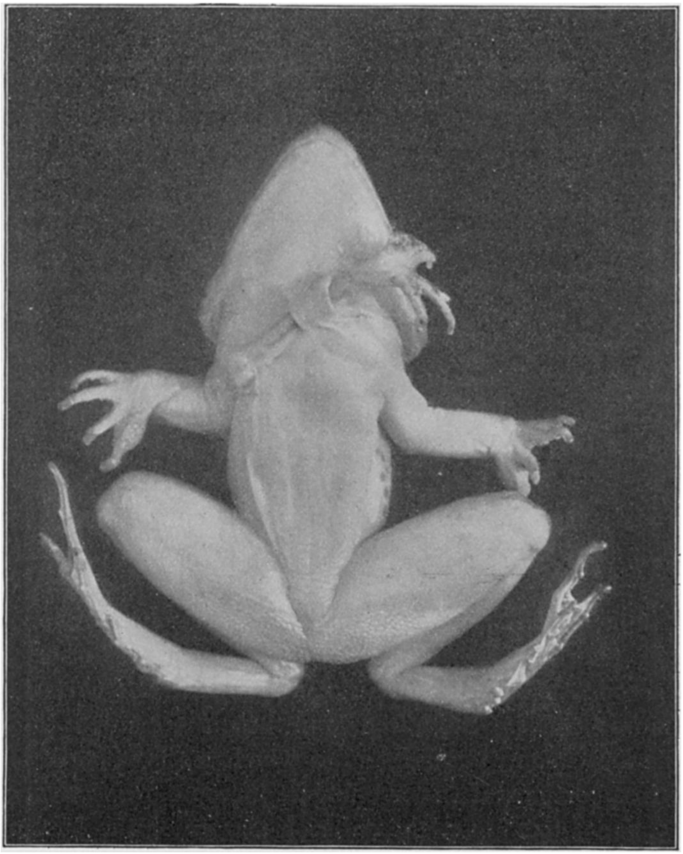

FIG. 1.—Ventral view of *Rana pipiens*, with supplementary arm.

genus. It is possible that some of the genera of fishes without ventrals have arisen from such prepotent variants, a supposition that is reinforced by the following case of variation.

3. The variation of greatest importance to be recorded here was found in nine specimens of *Ameiurus melas*. These were collected at random, out of a lot that must have numbered fifty or more, in a small cave at Glasgow, Ky. The fact that the specimens showed a remarkable series of variations was not detected until after they had been brought to the laboratory, so we can safely assume that they were collected at random and not with respect to the variations to be recorded. The specimens seen in the cave were all of approximately the size of the individuals here recorded. Unless they represent a dwarf race living in the small brook in this cave, they are probably of the same age. One of us visited this cave two years ago, and he neither remembers to have seen any catfishes in the cave stream at that time, nor are any specimens in the collection made at that time. While the fact that he does not remember to have seen them and did not collect any two years ago is not conclusive evidence that there were no catfishes in the cave at that time, the size of the specimens, taken together with this, makes it probable that the present specimens are under two years old and got into the cave either as a batch of eggs or during their schooling stage. It is well known that the young of the catfishes remain together as a school for

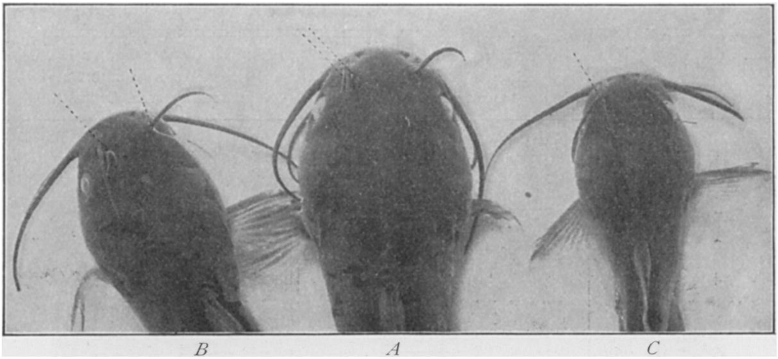

FIG. 2. — *Ameiurus melas*, showing supplementary narial barbels (see directive lines).

many days after hatching. It is not probable that they migrated into the cave as separate individuals, unless they came from a source as limited in extent as the cave itself. Specimens migrating from a more extensive source would, under no probability, show the similarity of variation to be here recorded.

In common with all the other North American fresh-water catfishes, *Ameiurus melas* is provided with a barbel in front of each posterior nasal opening. In the specimens under consideration there are usually one or more additional barbels behind the first, frequently on the anterior lip of the nasal opening. These barbels in detail are as follows, all measurements being in millimeters[1]:

Number of Specimens.	Length.	Length of the Left Nasal Barbels and the Supplemental Ones.	Length of the Right Nasal Barbels and the Supplemental Ones.
1	110	$\frac{2 - 4^{a}}{1}$, **15**, 6	**16**, 1[b] (Fig. 2 *A*)
2	86	$\frac{4 - 4^{c}}{1}$, **12**	**11**, 7.9 (Fig. 2 *B*)
3	78	**11**[d]	**11**, 2
4	78	**11**, 6	**11**, 4 (Fig. 2 *C*)
5	78	**11** and small lobe	6, **10**, 2
6	76	**11**, $\frac{2\frac{1}{2} - 2^{e}}{1}$	**11**
7	74	minute, **11**, 3	minute, **11**, $1\frac{1}{2}$
8	74	**10**, minute	**10**, lobe on narial lip
9	78	**11**, 1	**10**, 1

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[a] On the left side there are two supplemental barbels. One behind the inner edge of the main barbel is 6 mm. long. One behind the outer edge is T-shaped. The basal segment is but 1 mm. long. The upper segment slants from behind upward and forward. Behind the basal segment it is 2 mm. long, the portion in front 4 mm.

[b] Placed on the edge of the narial lip.

[c] The supplemental barbel is Y-shaped, with the basal segment 1 mm. long, the distal segments each 4 mm., and placed on the edge of the narial lip.

[d] Here there are two lobes on the narial margin, but no distinct development of barbels.

[e] Y-shaped, with a basal segment 1 mm. long, and distal segments respectively $2\frac{1}{2}$ and 2 mm.

[1] In the columns of lengths the figures representing the lengths of the various supplemental barbels are placed in the same relation to the length of the main barbel as the supplemental barbels are placed to the principal barbel.

The length of the normal barbel is indicated in the table by heavy figures.

Summarizing these data, we get the following:

Number of cases with two barbels: left, 3; right, 2.
Number of cases with one barbel: left, 6; right, 7.
Number of cases with a Y or T shaped barbel: left, 3; right, 0.
Number of cases with no supplemental barbel: left, 0; right, 1.
Number of cases with one on the left and none on the right, 1.
Number of cases with one barbel on each side, 4.
Number of cases with two barbels on each side, 1.
Number of cases with two barbels on the left and one on the right, 2.
Number of cases with one barbel on the left and two on the right, 1.

Total length of all supplemental barbels, not counting minute lobes, ΣV: left, $37\frac{1}{2}$; right, $24\frac{1}{2}$.

Average variation, $\frac{\Sigma V}{N}$: left, 4.166; right, 2.722.

While it is difficult from the variety of elements (number, length, shape) that enter into each variation to make a direct estimate of the degree of variability of each side and the degree of correlation of the variation of the two sides, the number of individuals is so small that an approximation can be arrived at by a glance at the data.

The left side is much more variable than the right.

The presence of barbels on the two sides is an indication of bilateral correlation. This is reinforced by the fact that in five out of nine cases the number of barbels on the two sides is the same. It would seem that the left side is leading in the addition of barbels, in spite of the fact that in one specimen no supplementary barbel is found on this side.

Admitting, in the absence of evidence to the contrary and strong probability in its favor, that the specimens belong to one brood, or, at the very least, that the specimens occupying the narrow limit of environment in which they are found are genetically related, we may deduce some interesting conclusions from the preceding data:

1. The variation here recorded is saltatory.
2. It is bilateral, without reaching perfect bilateral correlation. This makes it probable that primarily the variation was introduced or induced by changes on one side. Judging from its greater variability, the left side was primarily concerned.
3. It is improbable that the variation originated independently in each of the specimens.
4. The variation probably arose in one of the ancestors of the specimens.
5. Admitting 4, the saltatory variation arising in an ancestor was prepotent to a very high degree.

There are entirely too many probabilities in these conclusions, in spite of the fact that the probabilities all verge nearer certainty than uncertainty. The matter of the prepotency of the variation can readily be determined by breeding some specimens from the cave with normal specimens, which will be attempted.